



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Monitoring of squirrelpox in Scotland's red squirrels (*Sciurus vulgaris*) – identification of a sentinel case in a naïve population?

Citation for published version:

Wilson, L, Marr, M, Everest, D, Percival, A, McInnes, C, Logie, C, Beckmann, K, Lurz, P, Ogden, R & Milne, E 2023, 'Monitoring of squirrelpox in Scotland's red squirrels (*Sciurus vulgaris*) – identification of a sentinel case in a naïve population?', *European Society of Veterinary Pathology and European College of Veterinary Pathologists*, Athens, Greece, 7/09/22 - 10/09/22 pp. 53-54. <https://doi.org/10.1016/j.jcpa.2023.03.047>

Digital Object Identifier (DOI):

[10.1016/j.jcpa.2023.03.047](https://doi.org/10.1016/j.jcpa.2023.03.047)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



gland adenocarcinoma [MGA] (15.7%) and lymphoma (15.0%) were most common. Skin (29% fibrosarcoma, 29% epithelial, 20% melanocytic, 10% piloleiomyosarcoma), parathyroid gland (adenoma), gallbladder (adenocarcinoma/adenoma: 60%/40%), intestines (adenocarcinoma), mammary gland (all malignant epithelial), testes (germ cell/stroma) and bone (osteosarcoma/myeloma) exhibited only primary tumours. Mean ages of specified African (n = 50), white African (n = 6) and Asian lions (n = 19) were 16, 12 and 12.6 years, respectively. Barbary lions (n = 3) were all >16 years old. Females dominated sex ratios in African (62%), and white African populations (100%). By subspecies the commonest tumours were: African: MGA (27.3%); white African: cutaneous mesenchymal tumours (57.1%); and Asians: haemangiosarcoma (42.1%). Three Barbary lions exhibited respectively MGA (pulmonary/hepatic/splenic/renal metastasis), uterine adenocarcinoma (pulmonary metastasis) and splenic erythrophagocytic T-cell lymphoma (nodal metastasis).

Conclusions: Metastasizing malignant neoplasms of mammary gland and lymphoid origin are dominant in lions (>12 years).

PATHOLOGICAL FINDINGS IN A BY-CATCH PREGNANT STRANDED HARBOUR PORPOISE (*PHOCOENA PHOCOENA*) ON THE BLACK SEA COAST

M.A. Minea*, R.I. Rizac*, C. Timofte†, B.G. Fuerea*, M. Militaru*, T. Soare*. *University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Veterinary Medicine, Bucharest, Romania; †Mare Nostrum NGO, Constanța, Romania

Introduction: Stranded cetaceans on the Black Sea coast are not a rare view, especially during the summer period when the number of strandings peaks. Although, according to local authorities, 2021 was the year with the least number of strandings of the last decade, this case highlights an ongoing threat to the dolphin population: by-catch.

Materials and methods: A complete necropsy examination was performed on a pregnant female harbour porpoise (*Phocoena phocoena*) that had been stranded on Olimp Beach, Constanta county, Romania. Organs and tissues were submitted for routine histopathological examination.

Results: The gross examination quickly revealed the cause of death. A massive abdominal haemorrhage was identified. Regarding the exterior examination of the dolphin, the specific protocol used for assessing signs of human interaction confirmed the by-catch, since it revealed signs of trauma. Besides the aforementioned lesions, numerous large nodular masses were observed within the gastric mucosa. Gross and microscopic evaluation of these structures revealed the presence of different larval stages of *Pholeter gastrophilus*, together with a foreign body granulomatous reaction.

Conclusions: Even though most of the by-catch cases cannot be identified due to the lack of animals that return to the coast after death, the lesions exhibited by this dolphin allowed the definite confirmation of human interaction. The necropsy and microscopical evaluation tell the complete story of this stranding event and must raise awareness regarding the protection of this wild species.

PLEURAL MESOTHELIOMA IN A KINKAJOU (*POTOS FLAVUS*)

A. Angelova, J. Nešpor, L. Frgelecová, B. Moldovan Putnová, M. Škorič. Department of Pathological Morphology, Faculty of Veterinary Medicine, University of Veterinary Sciences, Brno, Czech Republic

Introduction: Mesotheliomas are malignant tumours of the serosal epithelium lining the pericardial, pleural and peritoneal cavities. Like in humans, the disease is rare in both domestic and wild animals. Here we present a case of pleural mesothelioma in a captive procyonid kinkajou (*Potos flavus*).

Materials and methods: A 6-year-old male kinkajou with a brief history of dyspnoea and inappetence died suddenly while being captured. It was submitted for necropsy. Tissue samples were collected, and routine histopathological examination was performed. Immunohistochemistry with primary antibodies against cytokeratin 5/6, vimentin, synaptophysin, calretinin, CD3, CD20 and Melan-A served to detect epithelial, mesenchymal,

endocrine, mesothelial cells, lymphocytes and melanocytes, respectively. Staining for E-cadherin was also included.

Results: At necropsy, a haemohydrothorax of appr. 150 ml was observed. An irregular solid mass was found arising from the left costal pleura, accompanied by multiple nodules (1–3 cm) covering the parietal and visceral pleura and diaphragm. The cut surface of the masses showed multifocal haemorrhages and necrosis. Histologically, the masses were comprised of oval to polygonal, occasionally elongated neoplastic epithelioid cells that showed strong calretinin, variably intense E-cadherin and weak multifocal vimentin and cytokeratin 5/6 co-expression. A diagnosis of pleural mesothelioma was made.

Conclusions: To our knowledge, this is the first report of a pleural mesothelioma in a kinkajou. Mesotheliomas are known to be correlated with exposure to asbestos fibres. However, several other potential risk factors, including exposure to other mineral fibres (erionite and fluoro-edenite), carbon nanotubes or radiation, have been identified.

CUTANEOUS HISTOPLASMA CAPSULATUM INFECTION IN A WILD BADGER (*MELES MELES*) IN THE CZECH REPUBLIC

J. Nešpor*, A. Angelova*, J. Pikula†, H. Band'ouchová‡, M. Kolařík‡, L. Frgelecová*, M. Škorič*. *Department of Pathological Morphology, Faculty of Veterinary Medicine and †Department of Ecology and Diseases of Zoo Animals, Game, Fish and Bees, Faculty of Veterinary Hygiene and Ecology, University of Veterinary Sciences, Brno, Czech Republic; ‡Institute of Microbiology, Czech Academy of Sciences, Prague, Czech Republic

Introduction: Histoplasmosis is a disease of humans and animals caused by the fungus *Histoplasma capsulatum*, resulting in granulomatous inflammation of various tissues. The disease is rare in Europe. Here we report the first case of cutaneous histoplasmosis in a wild badger (*Meles meles*) in the Czech Republic.

Materials and methods: A wild badger was found dead near a road. The body was collected and submitted for necropsy. Tissue samples were collected for histopathological examination. Staining with haematoxylin and eosin and periodic–acid Schiff (PAS) reaction was performed. A PCR using primers to amplify the *Pap1f* and *Pap1r* genes of *H. capsulatum* was applied on unfixed tissue samples. The PCR product was sequenced, and the resulting sequence compared in the GenBank database.

Results: Grossly, the animal exhibited multiple nodular lesions in the skin of the ventral part of the body. The nodules were prominent grey-coloured masses, firm, up to 5 cm in diameter, often haemorrhagic and ulcerated. Histologically, these were represented by focal dermal granulomatous infiltrates of macrophages, lymphocytes, plasma cells and neutrophilic granulocytes. Numerous fungal elements were localized within macrophages and also cell-free scattered throughout the dermis. They had a central nucleus surrounded by a clear zone and stained well with PAS. The PCR examination yielded *H. capsulatum* specific sequences.

Conclusions: Histoplasmosis is a rare disease in European badgers so far mainly reported from the southern and western parts of Central Europe. In the majority of these cases involvement of other organs, such as lymph nodes and spleen, was observed.

MONITORING OF SQUIRRELPX IN SCOTLAND'S RED SQUIRRELS (*SCIURUS VULGARIS*) – IDENTIFICATION OF A SENTINEL CASE IN A NAÏVE POPULATION?

L.A. Wilson*, M. Marr*, D. Everest†, A. Percival‡, C. McInnes‡, C. Logie*, K. Beckmann*, P. Lurz*, R. Ogden*, E. Milne*. *Royal (Dick) School of Veterinary Studies, Edinburgh, UK; †Animal and Plant Health Agency, Addlestone, UK; ‡The Moredun Research Institute, Edinburgh, UK

Introduction: Following their introduction to the UK, grey squirrels (*Sciurus carolinensis*) have substantially expanded their range, bringing grey squirrels into conflict with native British red squirrels (*Sciurus vulgaris*). This has resulted in decreases in red squirrels, which is partly related to the introduction of squirrelpox virus (SQPV), the causative agent of squirrelpox (SQPx), for which grey squirrels act as a reservoir host.

Materials and methods: An ongoing national surveillance programme identified SQPV on both tail hair and whiskers from a red squirrel, submitted from Perth and Kinross (Central Scotland) in September 2020 by opportunistic sampling. This was the most northerly identification of SQPx to date and may represent a sentinel case of the northerly spread of SQPx. Antibody ELISAs were used to assess the seroconversion in Central Scotland compared with endemic areas (Dumfries and Galloway) to the south and naïve areas (Highlands) to the north.

Results: All red squirrels submitted during 2019 and 2020 from these three areas were assessed, which identified seroconversion only within Dumfries and Galloway (ie, the historically endemic area). Nested PCRs are currently being used to assess the SQPV exposure within this trial area.

Conclusions: This potential identification of SQPx in Perth and Kinross is concerning. Should SQPx become established, this may have a substantial impact on local red squirrel numbers. This may also facilitate spillover and further northerly spread into other naïve areas, perhaps including northern red squirrel strongholds. Further work is required to fully characterize this population and sentinel case.

PATHOLOGY AND CAUSES OF DEATH IN CAPTIVE MEERKATS (*SURICATA SURICATA*) AND A REVIEW OF THE LITERATURE

B. Martí-García, S.L. Priestnall, A. Suárez-Bonnet. *Pathobiology & Population Sciences, Royal Veterinary College, North Mymms, Hatfield, UK*

Introduction: Meerkats (*Suricata suricatta*) are endemic carnivores of southern Africa and, although currently listed as “least concern” by the International Union for Conservation of Nature (IUCN) Red List, there is evidence of a significant decrease in wild populations mainly attributed to climate change. Little is known about diseases associated with mortality in captive meerkats.

Materials and methods: Herein we present a series of seven captive meerkats that died or were euthanized and submitted for post-mortem examination at the Royal Veterinary College, between 2018 and 2022.

Results: Three animals died without clinical signs, two exhibited neurological signs and two collapsed after conspecific fighting. The main macroscopic findings included pulmonary oedema and/or congestion (n = 4), gastrointestinal foreign bodies (n = 3), pulmonary nodules (n = 2), liver congestion (n = 3) and traumatic lesions (n = 3), followed by visceral inflammatory lesions (ie, peritonitis) (n = 2), systemic arteriosclerosis (n = 1), intraventricular cholesterol granuloma (n = 1), interstitial pneumonia (attributed to *Angiostrongylus vasorum*) (n = 1) and emaciation (n = 1). Microscopically, the commonest findings were pulmonary oedema and/or congestion with or without alveolar haemorrhages (n = 4), hepatic lipoidosis (n = 2) and focal or multifocal bronchoalveolar adenomas (n = 2).

Conclusions: Systemic atherosclerosis, also involving muscular veins, associated with thrombosis and concomitant large intraventricular cholesterol granulomas is reported for the first time. These data emphasize the need for further study of meerkat mortality in both captive and wild populations, of the behavioural and environmental factors that may contribute to population decline and highlight the importance of thorough pathological examinations, especially in cases of sudden death.

HISTOLOGICAL, LECTIN HISTOCHEMICAL AND IMMUNOHISTOCHEMICAL STUDY ON THE NORMAL KIDNEYS AND RENAL LESIONS OF AFRICAN PYGMY HEDGEHOGS (*ATELERIX ALBIVENTRIS*)

Y. Tanaka, K. Watanabe, T. Mineshige, Y. Kobayashi. *Laboratory of Veterinary Pathology, Obihiro University of Agriculture and Veterinary Medicine, Obihiro, Japan*

Introduction: Recently, African pygmy hedgehogs (*Atelerix albiventris*) have become popular pets worldwide and are hence more frequently seen in diagnostic pathology. We have found renal lesions in a considerable number of these animals. The present study aimed to (1) reveal lectin and immune reactivity of urinary tubules of normal hedgehog kidneys by lectin histochemistry and immunohistochemistry, and (2) examine the renal lesions histopathologically.

Materials and methods: Twenty-five African pygmy hedgehogs were examined. All renal sections were stained with HE, and some sections were subjected to histochemical stains including lectins (SBA, PNA, Con-A, PHA-E4, WGA, DBA and UEA-1) and IHC for E-cadherin.

Results: In normal renal cortex, proximal tubules were strongly stained with SBA, PNA, Con-A and PHA-E4, and distal tubules were strongly labelled with WGA and for E-cadherin. DBA and UEA-1 were not detected in both proximal tubules and distal tubules. Renal lesions were observed in 17 cases, and classified into three types. Type 1 (11/25 cases) were represented by focal cortical wedge-shaped fibrosis and type 2 (9/25 cases) by focal subcapsular cortical accumulation of glomeruli and immature renal tubules. These lesions were extensive, affecting 30–80% of the renal cortex. Within those foci, lectin histochemistry and immunohistochemistry revealed an abnormal distribution of proximal tubules and distal tubules. Type 3 (5/25 cases) lesions were represented by fatty degeneration of cortical tubular epithelium.

Conclusions: Type 1 renal lesions are consistent with renal infarction, type 2 lesions with renal dysplasia as reported for other species, and type 3 changes a consequence of hyperlipidaemia or other abnormalities of the fat metabolism.

CHARACTERIZATION OF HAEMOLYMPHATIC TISSUES IN CAPTIVE BOA CONSTRICTOR AS A BASIS FOR FUNCTIONAL ASSESSMENTS

E. Dervas, U. Hetzel, A. Kipar. *Institute of Veterinary Pathology, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland*

Introduction: Our knowledge of the reptile immune system is very limited. Thymus, spleen, gut-associated lymphoid tissue (GALT) and bone marrow (BM) are described but reports on their organization and specific functions are sparse. Therefore, we aimed to establish a basis for evaluation of haemolympathic tissues (eg, immunosuppressive conditions) by systematically examining their architecture and composition in the Boa constrictor.

Materials and methods: Spleen, thymus, GALT and BM of 25 boas (both sexes; 1–10 years) from a reptile sanctuary that were euthanized and necropsied for regular health monitoring were processed for histology, immunohistochemistry (T cells: CD3+; monocytes/macrophages: Iba-1+), RNA-ISH (CD20) and ultrastructural examination. Histological examination of all major organs confirmed the absence of pathological processes.

Results: The BM harboured haematopoietic precursor cells within lacunae along the entire vertebral column. The thymus, a single lobed organ next to the distal trachea, exhibited a cortex comprised of T cells and a medulla that also contained epithelial cells, B cells, macrophages and myoid cells. GALT was found along the entire alimentary tract, as aggregates of T cells and fewer B cells. The spleen, a multilobulated organ adjacent to the pancreas and gallbladder, lacked follicle formation but exhibited small B cell aggregates and cells ultrastructurally consistent with plasma cells, intermingled with T cells and macrophages.

Conclusions: The BM and thymus of boas (and reptiles) is structurally comparable to other animal classes. Spleen and GALT lack follicle formation, but plasma cell differentiation appears to take place. Hence, evaluation of the immune system in reptiles remains challenging.

LIVER HISTOPATHOLOGY AND BLOOD BIOCHEMICAL PARAMETERS IN ELKS (*ALCES ALCES*) WITH HEPATIC PARAFASCIOLOPSIS FASCIOLAEMORPHA INFESTATION

B. Bergmane*, D. Bērziņa*, M. Zolovs†‡. * *Faculty of Veterinary Medicine, Latvia University of Life Sciences and Technologies, Jelgava, Latvia;* † *Institute of Life Sciences and Technology, Daugavpils University, Daugavpils, Latvia;* ‡ *Statistics Unit, Riga Stradins University, Riga, Latvia*

Introduction: *Parafasciolopsis fasciolaemorpha* is one of the most common liver flukes of elk in Central and Eastern Europe. In 2021, the Latvia elk population was estimated to be around 23,000 animals. Previous epizootic data showed that 24% of the population carries the parasite. However, little is still known about its effects on liver structure and function. We therefore evaluated the hepatic histopathological changes and the blood biochemistry of elk infested with *P. fasciolaemorpha*.